the heat released, therefore, serves to heat the ingots and to maintain the hot gases at a high temperature. If the flames, that is to say, the mixture of combustible gases and air, in which the reaction is taking place, impinge against the cold ingots, a deposit of soot will be formed, and carbon, carbon monoxide and hydrogen will pass off unburned through the waste gas port. It is evident that such a method is not advantageous, as it is necessary for combustion to occur in the heating chamber in order that the heat may be utilized. From this effect it is evident that the flaming gases should not be cooled while the reaction of combustion is taking place or until it has been completed. On the contrary, if the reactions of combustion are very nearly completed, the hot gases produced may be cooled very rapidly.

The Lyswa furnace has a large firebox, allowing the producer gas to mix perfectly with the secondary air. On the other hand, in the " N " furnace there is a very small firebox with very poor mixing of the producer gas and the secondary air. The flaming gases from this firebox are forced directly down upon the ingots without any precautions; the production of soot is inevitable. It is for this reason that these gases sweep along under the roof, from the strangulation which is located immediately over the bridge wall, to obtain a better mixture; and from this point on the velocity of the gases is increased, thus diminishing the thickness of the layer of gases below the arch. As a result of these conditions, the furnace works very poorly.(1)

A furnace at the *Zavertse* works, where the height from the hearth to the roof is only 350 mm, will serve as an example of a continuous reheating furnace with a very low roof. This furnace gives off enormous quantities of smoke when coal is placed in the firebox. There is no flame in the heating chamber and the heat there is not sufficient to ignite the gaseous products which are

given off in great volume by the fresh charge of coal as it is distilled on the fire.

Continuous reheating furnaces, therefore, will not work well with low roofs; on the other hand, the fuel consumption increases very rapidly as the roof is raised. From Yesmann's formula it can be deduced that

[1] The formation of soot by the cooling down of the flaming gases is particularly noticeable in open-hearth furnaces working with a charge of cold pig.